MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2016/2017

TRQ 3211/TIS3151 – SOFTWARE RELIABILITY AND QUALITY ASSURANCE

(All sections / Groups)

12th October 2016
9 am - 11 am
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 5 pages excluding the cover page with 5 Questions only.

2. Attempt all **FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the Answer Booklet provided.

QUESTION 1

a. There are THREE major differences between software products and other industrial products.

(i) Identify and describe the differences.
(ii) Discuss how these differences affect Software Quality Assurance (SQA).

[5 Marks]

b. In 1996, an European Ariane 5 rocket was set to deliver a payload of satellites into Earth orbit, but problems with the software caused the launched rocket to veer off its path a mere 37 seconds after the launch. As it started disintegrating, it self-destructed (a security measure). The problem was the result of code reuse from the launch system's predecessor, Ariane 4, which had very different flight conditions from Ariane 5. More than $370 million were lost due to this error.
(Source: http://royal.pingdom.com/2009/03/19/10-historical-software-bugs-with-extreme-consequences/)

Identify the cause of software error and explain your answer.

[2 Marks]

c. Assume that a local information system installed in each of the stores (chain of furniture store) that manage the sales and local inventory. The local information system interoperates with a central inventory system, and has to transfer its transactions of sales and suppliers' shipments to the central system. The central inventory system supplies information on the availability of an item in other stores of the chain. Application of this information enables a store to fulfill clients' orders when an insufficient quantity of the item is found in the local store – improved service to clients and more economic inventory management.
Explain how ***interoperability*** requirements can negatively affect the ***correctness*** level of the software system based on the example above.

[3 Marks]

d. Consider the pseudo code below:

```
LET X = 10
IF (X = 10) THEN PRINT X ELSE PRINT Y
```

In your opinion, what is wrong with the above code?

[2 Marks]

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QUESTION 2

a. Explain the relationship between reliability and efficiency.

[2 Marks]

b. Biometric is an automated process which is used to recognize individuals based on biological and behavioral characteristics. Identify ***failure classes*** for each situation below. ***Justify*** your answer.

i. Occasionally, the biometric system fails due to poor-quality biometric samples.

ii. The biometric system fails for all types of input regardless of the quality of the samples and the state of biometric hardware and software.

[4 Marks]

c. It has been suggested that the control software for a radiation therapy machine, used to treat patients with cancer, should be implemented using N-version programming.

(i) Identify at least **one** advantage and disadvantage on the implementation of N-Version programming and
(ii) Comment on whether or not you think this is a good suggestion.

[4 Marks]

d. Modify the code below to do continual checking on the code to detect exceptions?

```
1. import java.io.*;
2. public class Example{
3.
4.     public static void main(String args[]){
5.           int a[] = new int[3];
6.           System.out.println("Element four :" + a[4]);
7.           System.out.println("I am done");
8.     }
9. }
```

[2 Marks]

...Continued

QUESTION 3

a. Explain ***path coverage*** and identify different paths in the program flow chart for the software module in Fig.1 below:

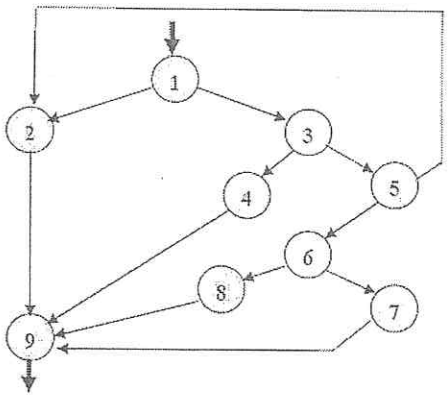

Fig. 1

[3 Marks]

b. Based on the diagram in Fig. 2 below, identify the software replacement simulator that can be used to replace the unavailable modules, X1 and X2 when performing unit or integration test. Explain your answer.

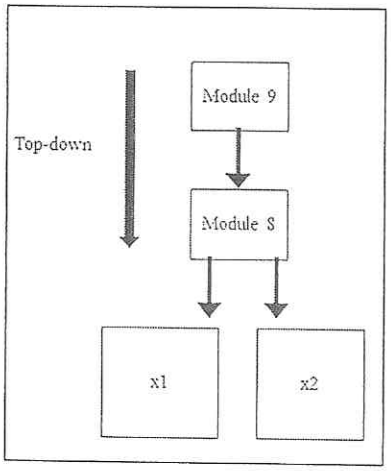

Fig. 2

[3 Marks]

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c. Insight Corp. wins a tender for the development of complex management software for an electronics company. What type of 'Peer review' would the project manager choose to use and why?

[3 Marks]

d. Is it necessary to have a contract review for 'internal projects'? Justify your answer.

[3 Marks]

QUESTION 4

a. Roger is asked to test run a program. State any THREE attributes he can measure during code execution.

[3 Marks]

b. Rohan has formed a team of professionals to work on a large project, who would be using various tools and different programming languages during development of this software.

(i) What type of measurement of **size** technique would Rohan choose to use?

[0.5 Mark]

(ii) Justify his choice with **two** important reasons

[2 Marks]

(iii) What would be the disadvantage of using this method

[0.5 Mark]

c. While drafting the Verification and Validation Plan (VVP), the quality manager will have to ensure that all requirements have been tested. What method will he have to use during the 'Schedule Phase' to ensure that all requirements have been tested and why?

[3 Marks]

d. Why do many software companies prefer to have consultants carry out an Independent Verification and Validation (V&V) exercise? What would be the deliverables at the end of a V&V activity?

[3 Marks]

...Continued

QUESTION 5

a. Mr. Nishikori is the new quality manager for SoftwareTech Sdn. Bhd. He insists in implementing Total Quality Management (TQM) in the organization. Give 3 reasons why he feels it is essential to have TQM in the organization.

[3 Marks]

b. A project manager refuses to allow his team members to attend conferences or training.

(i) What is the type of risk involved in this situation?

[1 Mark]

(ii) How will this risk affect the company and the team in the long run?

[1 Mark]

c. The risk management team needs to make a risk plan for a new project. What type of questions will they need to ask in order to plan for :
(i) Risk mitigation (ii) Risk monitoring and (iii) Risk management?

[4.5 Marks]

d. A valuable technique to help evaluate and fix the delivery process is 'project postmortem'. Explain what is done during this process.

[0.5 Marks]

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